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ABSTRACT

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Self-image and Expectations of First Year Engineering Students in a Brazilian University

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Abstract: This paper is an attempt to comprehend, in a more objective way, the students undertaking the second semester at the Technical and Scientific Center from the Pontifical Catholic University of Rio de Janeiro (PUC-Rio). The research was carried out at the beginning of the semester, in one of the classes formed by students undertaking General Chemistry. From a sample of 300 students in similar situation, 37 students answered the questionnaire. We also aimed to check on their background image of Chemistry that was developed during their high school studies, as well as their expectations of involvement in this subject of study. The analysis of the answers presented here was carried out in relation to a questionnaire, divided in two groups of questions. The first one dealt with general issues and investigated the student's self image and self-assessment. The second one is strictly related to Chemistry. Some of the teaching staff ideas about the students were also checked upon and as a result of further analysis actually perceived as being pre-conceived.

Keywords: student's self-image, student's expectations, teacher's preconceptions

1. Introduction

The Pontifical Catholic University of Rio de Janeiro (PUC-Rio) has a prominent place amongst the Brazilian Universities. It's the only private university, which has the majority of its teaching staff working on a full time basis and greatly dedicated to research. A similar situation can only be encountered amongst some of the government-subsidized universities. Bearing about 11000 degree students with a total of 20 courses in the Human, Social and Scientific areas, it cannot be considered such a big university. Its Technical and Scientific Center consists of several Engineering, Informatics and Basic Sciences (Physics, Maths and Chemistry) departments. All the degree courses gathered by this center require the first four semester for a cycle of common studies (the so called *basic cycle*), obligatory to all students, after which the student can choose for a course and specific qualification. Given its renowned good reputation in the Brazilian scenery, the demand for vacancies at PUC-Rio has always been intense. Such a high number of students per vacancy has traditionally required a very tough admission selection process – a specific admittance test, the 'vestibular'. All this allowed for a careful selection of students amongst a large group with the consequent admission of very well prepared students who could stand up to the certainly very hard *basic cycle*. However, in the last years, this picture has been markedly changing. The youngsters' loss of interest in the technical careers noticed all over the world, also happens in Brazil. Low wages and uncertain employment perspectives have also been contributing to drive the young away from these careers. In the specific case of Brazil, contributions to this current situation can be traced back to a period (the 70's) of developme ntal euphoria heavily supported by the state (which privileged the technical careers), followed by political changes associated to the government's opening to globalization and state withdrawal from economy (the 90's). Besides, the PUC -Rio, which is a very expensive university, receives mostly students from a high level of income class. This situation is obviously restricting the universe of candidates a great deal. The competition with the government universities, which are free, and the candidate's family economic situation are certainly dictating our student's profile. Finally, the loss of government subsidy to the university (the current situation during the 70's and 80's) determined a very significant increase on the fees. As a result, there was a drastic decrease on the number of candidates per vacancy throughout various courses. Beyond these questions, particular to the PUC-Rio, it's common sense, in our society, that the cognitive and cultural level of our high school students has decreased in an inverse ratio in relation to the

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popularization of this same level of studies that has been taking place in Brazil for the last two decades [1]. The admission of students that are less prepared and fairly immature is considered to be a result of this situation.

These would be then, the main cause for our students' collection of unsuccess (as well as failures and evasion from university). The image of students less prepared and fairly immature has crystallized itself amongst many teachers who consider that the relation effort-benefit inherent to any attempt to mitigate this reality would always be unfavorable. On the other hand, the newcomer student doesn't know about this pre-conceived image that is associated to him and believe that, on the contrary, once he was admitted to the university, he is prepared to undertake his studies.

2. Methodology

The information was obtained by means of a fairly straightforward questionnaire answered by the students in their third week of course before having had any sort of assessment. The class was composed of a total of 43 students, in which 37 answered voluntarily and anonymously. From this group 15 had already attended the subject and failed whereas the rest of the group was attending it for the first time. All of them had attended University for at least a semester, not being therefore freshman students. When adequate, the answers ranged from 1 to 5, so as to grade its intensity. Part of the questions were of a general nature while the others aimed to evaluate the student' s relationship with the General Chemistry course, which they were about to begin. Ultimately, we intended to establish the better strategy to approach the subject.

3. Results and Discussion

In relation to the general question answers, a significant proportion of the students (29%) asserted that PUC-Rio was their first choice amongst the universities in Rio de Janeiro and 26% of the students were admitted on first call. In other words, a significant number of students still perceive PUC-Rio as the university that better suits their interests. The questionnaire answers also showed that almost all the students came from the best renowned high schools in the city and they all had, or thought they had, a firm position towards the career they wanted to follow Electrical (31%) and Production (21%) Engineering were the most frequent choices. Apart from that, they also believed they had very good knowledge of the profession they had chosen. They also expected they would have a good performance on their degree studies (Fig. 1). It is worth to note that the maximum possible grade for these questions was 5 and its average grade stayed around 4! In Fig 2 it can be seen that vocation came in first place determining their career choice, closely followed by the expectation of good employment opportunities and salary. As for their placement in the labour market (Fig 3), the hopes for a good job at a big company are still their main objective though the dream of becoming a successful entrepreneur is not dismissed at all.

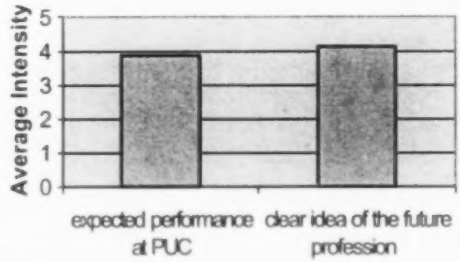

Fig. 1. Students' expected performance during undergraduation and consciousness of the future profession

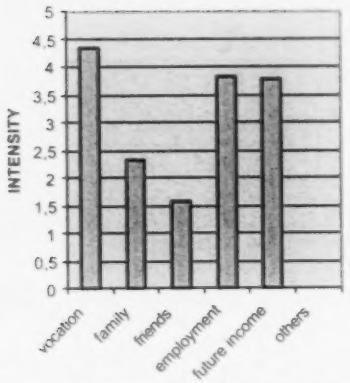

Fig. 2. Relative importance of the factors that influenced the future profession choice

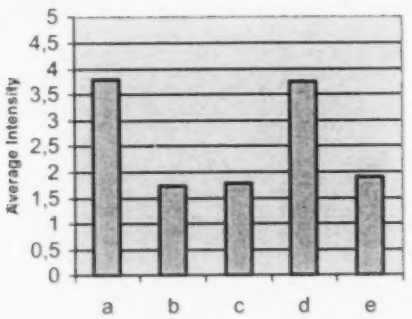

Fig. 3. Students' future employment expectations: employment in (a) big company, (b) state company, (c) small company, (d) entrepreneur, (e) liberal arts

The analysis of the answers obtained raises some considerations. The PUC-Rio continues to be highly attractive to a substantial amount of students admitted. The idea that these students are not well prepared finds no backing in 'facts' once almost all of them come from the best possible schools. Therefore, they are representative of an elite, a highly selected group that always had access to the best education available in the city. If the 'best education possible' is not enough, that's another question. Nevertheless it can be assured that we are inheriting a much bigger question than if PUC-Rio does or doesn't any longer attract the best students in the city. Apparently these are the best students of these days. We tend to imagine our students as being lost and immature. But that isn't the idea they showed to have of themselves. They have already made up their minds about a career choice, they believe they have a very clear idea of their chosen profession, they basically opted to follow their vocations although expectations of good employment opportunities and salary give their choices a more pragmatic tone. This pragmatism could be interpreted as a contradiction to a vocational choice but it can also be looked upon as a sign of maturity and capability of seeing the world as it is. To sum up, although the weight put on vocation is admirable we should not condemn the pragmatism demonstrated. It's particularly interesting to note that, in spite of the fact that many of the interviewed students undertaking that subject are doing it for a second time because they've previously failed, they still expect to have a good performance on their degree studies. Surely, the reality that unfolds itself during their common studies cycle is quite frustrating as it breaks their expectations and the unsuccess rate (failure and evasion from course) is so high. Our students can not conceive the reasons for so much unsuccess and they end up

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questioning the image they have of themselves. Part of the group manage to react in a positive way but many just end up frustrated and so unmotivated that they give up their studies.

In relation to the questions that more specifically dealt with the subject in question (General Chemistry), near 50% of the students had regular chemist laboratory lessons during high school. Such an experience is only possible, all around Brazil, in the best schools. It's pertinent to point out that the absence of laboratory lessons during the undergraduate studies is taken as one of the reasons why our students are not well prepared to attend PUC's degree course. None of the students in this group had chosen Chemical Engineering or Chemistry as their career option; even so, according to Fig 4 they do not reject this subject. On the contrary, they well accept it. This data is very relevant as it is contradictory to a justification used by many teachers for their student's lack of interest and consequent bad performance. In other words, we cannot credit the student's bad performance or failure, to a previous dislike of the subject. Fig 5 confirms that there is some approval of the subject, which allow for the course be successfully carried out. Finally, it should be pointed out that the students credit their difficulties more to the subject contents than to the teacher's performance or quality of the lessons attended.

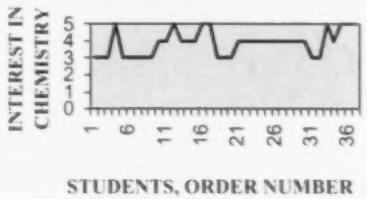

Fig. 4. Individual answers relative to students' interest in chemistry

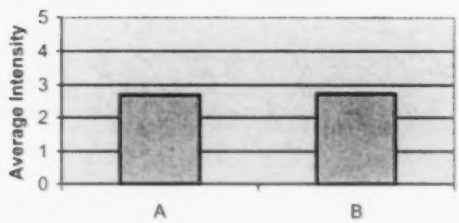

Fig. 5 Students' concern about chemistry: (A) importance of chemistry for a good formation; (B) importance of chemistry for their future professional performance

4.Conclusions

Conclusions on topics like these risk to be very personal as they are related to each one's life experiences and ways of seeing the world. So let's take some risk! The analysis of these answers indicate that the teachers, attempting to explain their student's unsuccessful performance, created some preconceived ideas about their students which do not correspond to the actual reality. The students know the reality of the world in which they live, they have a fairly clear vision of their purposes and they are open to new knowledge even on topics that are not directly related to the career they've chosen. On the other hand, they continue to come from the same high level schools as they used to. These are considered the best renowned schools in Rio. Therefore, even if these students are not prepared the way we want they are the least bad prepared ones we can expect to have. Besides, the unsuccess means, to the students, a great disappointment in relation to their expectations since they assume that, once admitted to the university, they

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are actually prepared to undertake their degree studies. Hence, the difficulties our students encounter might be more related to the dissociation between their imagery and ours than to the specific background knowledge they have. It's a question of communication or translation. Our formalism (not formality, as Brazilian university teachers are fairly informal) doesn't reach them. If we want to help them being successful, avoiding frustration and even evasion from the university, our main aim must be the establishing of links between the two realities. One strategy would be to have the freshman student engaged in activities that would strengthen the links between these two worlds. Strictly explanatory lessons, intended to introduce specific knowledge would give in space to new types of initiative. Such initiatives have already been taking place in the university for some time, although most of the time is still spent in essentially traditional activities. This would imply a change in the teacher's and university board posture towards a more pedagogic and strategically didactic work which would, on the other hand, sacrifice the so called 'contents' studied. The technical and specific knowledge, so valued in the Engineering and Natural Sciences areas is necessary but not enough to guarantee the teacher's good performance. Besides, it's well known that, if the learning process was not significant to the student, not much of this so called contents knowledge is going to 'remain'. If one believes that changes are indeed necessary one has to be radical when putting forward a proposal in this direction. One can not be bound just to changes in the curricular framework and subject summaries, which have periodically been occurring. In fact it's necessary to invest, during the initial semesters, in preparing the ground so that the actual significant learning process (the one which remains) can eventually take place. This initiative, in Brazil and certainly in other countries, would hardly come from secondary level schools. The university is actually more prepared for such initiative. The detailing of how to adopt this new strategy is beyond the present discussion. However, it certainly passes through dislocating the center of the learning process from the teacher to the student. Despite how much this can hinder our habits (or egos). Evidently, such initiative can only be successful if explicitly (materially) supported by the university. Small classes, compatible classrooms, higher investment in didactic materials, promotion of teacher training sessions, valorization of didactics experiments in one's career, etc.

5. References

[1] C.M. Castro, M. Carnoy and L. Wolff, "Secondary Schools and the Transition to Work in Latin America and the Caribbean" Sustainable Development Department Technical Papers Series, Inter-American Development Bank, Washington D.C., 2000.

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